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along the path of Leonardo, Kepler, Galileo, Huygens and Newton.

WILLARD J. FISHER

WORCESTER POLYTECHNIC INSTITUTE,

THE SCIENTIFIC MEMBERS OF THE BRITISH EDUCATIONAL MISSION

As has been noted in *SCIENCE*, the British government, on the invitation of the Council of National Defense, has sent to the United States a distinguished mission to inquire into the best means of procuring closer cooperation between British and American educational institutions, to the end, greatly desired on both sides, of making increasingly firm the bonds of sympathy and understanding that now unite the English-speaking world.

The members of the mission are:

Dr. Arthur Everett Shipley, vice-chancellor of the University of Cambridge, master of Christ's College and reader in zoology.

Sir Henry Miers, vice-chancellor of the University of Manchester and professor of crystallography.

The Rev. Edward Mewburn Walker, fellow, senior tutor and librarian of Queen's College, member of the Hebdomadal Council, Oxford University.

Sir Henry Jones, professor of moral philosophy, University of Glasgow.

Dr. John Joly, professor of geology and mineralogy, Trinity College, Dublin.

Miss Caroline Spurgeon, professor of English literature, Bedford College, University of London.

Miss Rose Sidgwick, lecturer on ancient history, University of Birmingham.

The proposed itinerary of the mission follows:

October	8-14—New York.
"	15-17—Washington (Mt. Vernon).
"	18—Baltimore.
"	19-21—Philadelphia (Bryn Mawr, Haverford).
"	22-23—Princeton.
"	24—New York (Vassar).
"	25-26—New Haven.
"	27—Amherst, Smith, Mt. Holyoke.
"	28-30—Boston and Cambridge (Wellesley).
"	31—
November	2—Montreal (Ottawa).
"	3-5—Toronto (Niagara Falls).

"	6—Ann Arbor.
"	7-12—Chicago (Urbana, Evanston).
"	13-14—Madison.
"	15-17—Minneapolis and St. Paul.
"	18—Des Moines (Ames).
"	19-20—St. Louis.
"	21—Cincinnati.
"	22—Lexington, Ky.
"	23—(Louisville).
"	24—Nashville.
"	25-28—New Orleans (Houston, Austin).
"	29-30—Tuskegee.
"	31—Chapel Hill.
December	1—Charlottesville.
"	2—Washington.
"	4-7—Boston and Cambridge.

The British Bureau of Information has prepared a statement concerning the members of the mission, and we give the biographical sketches of the scientific members.

DR. ARTHUR EVERETT SHIPLEY

Arthur Everett Shipley, Sc.D., vice-chancellor of the University of Cambridge, is well known in the United States, in which he has on several occasions been an honored guest. He is an honorary D.Sc. of Princeton University, foreign member of the American Association of Economic Entomologists and of the Helminthological Society of Washington. Dr. Shipley is a member of the Central Medical War Committee of Great Britain. He holds many offices of great responsibility, being, for example, a trustee of the great collection of specimens illustrative of many branches of science which was made by John Hunter, purchased by the government after his death in 1793, and presented to the Royal College of Surgeons; a trustee of the Tancred Foundation established by Christopher Tancred (1689-1754) of Whixley Hall in the County of York, to provide studentships in divinity and in physic; a trustee of the Beit Memorial Fund for fellowships for medical research; chairman of the Council of the Marine Biological Association; vice-president of the Linnæan Society; member of the Royal Commission on the Civil Service. In 1887 he was sent to the Bermudas by the Colonial Office to investigate a plant disease. He was also commissioned by the

British government to investigate grouse disease, and the volume on "Grouse in Health and Disease" which he published records many observations regarding the pathology of birds. He is a fellow of the Royal Society.

Dr. Shipley's writings on many branches of zoology and other subjects, historical, architectural and biographical, are too numerous for mention. They include several standard textbooks of zoology. The study of parasitical animals is his especial hobby. Since the commencement of the war he has written two books of extraordinary interest and humor, on a subject which, if less skilfully handled, would be generally regarded as repulsive—lice, bugs, fleas and flies—little animals which in all former wars have contributed to the failure of armies in almost as large a measure as swords or guns. But for recent knowledge of their habits the havoc which they have worked in this war, already sufficiently serious, might have been the determining factor. "The Minor Horrors of War" and "More Minor Horrors" are books which may be read with pleasure by the least scientifically inclined of men and women.

As master of Christ's College, Dr. Shipley inhabits a "lodge" which the foundress, the Lady Margaret, mother of Henry VII., once occupied. The lodge, like all similar houses, had been altered to suit the taste of each succeeding age. The new master immediately after his election devoted much money and antiquarian knowledge to its restoration to something like its original condition. Soon after the commencement of the war he turned the house into a convalescent home for wounded officers, several hundreds of whom have since lived with him. In other forms of war work he has also been very active, especially in the collection of clothes for Belgian refugees, and the maintenance and education of Serbian boys, for which the members of the university, with great generosity, made themselves responsible.

SIR HENRY MIERS

Sir Henry Miers was born in South America, where his father was an engineer (as his grandfather had been before him), but was

brought to England at the age of two. One of his great-grandfathers was Francis Place, the self-educated politician who was a leader in the reforms of 1824-1841.

He was educated at a private school near Oxford, where among his schoolfellows were the late Lord Parker, of Waddington, and George Macmillan, whose firm is well known in the United States. Thence he went with a scholarship to Eton, and was there for five years. The course at Eton was almost purely classical, but Miers did a considerable amount of science and mathematics out of hours, winning school prizes in these subjects among others. He also won the gold medal in geography offered at that time by the geographical society for competition among public schools; among the honorably mentioned on that occasion was his schoolfellow Cecil Spring-Rice, afterwards ambassador to the United States. Lord Curzon was also one of his exact contemporaries at Eton.

In 1877 he went with a classical scholarship to Trinity College, Oxford, and read double (classics and mathematics) for the first degree examination, and double (mathematics and physics) for the final examination. But he left Oxford before the final examination in the science school in order to prepare for a position which was about to be established in the mineral department of the British Museum. His interest in mineralogy had been stimulated at Oxford by Professor Story-Maskelyne, whose lectures he attended. The professor was then a member of parliament, and came up from London to lecture to Miers, who was for a time his only pupil. He also worked at the subject in the long vacation at Cambridge and in other vacations at the British Museum.

At the British Museum he was a first-class assistant for twelve years, and during that period published about fifty scientific papers. His teaching experience also began in London, for he was invited by Professor Armstrong to start the teaching of crystallography at the neighboring Central Technical College (which has now been absorbed in the Imperial College of Science and Technology). This continued for about nine years, when he was succeeded

by one of his first pupils, W. J. Pope, who is now professor of chemistry at Cambridge.

One of his adventures during the period of his assistantship at the British Museum was an attempt (in 1888) to make a balloon voyage to Vienna in company with Simmons, a well-known aeronaut, and a gentleman named Field. On approaching the coast of Essex it was thought prudent to descend, as the wind was in a too-northerly direction. The balloon, which was a very large one, was safely anchored to a tree, and the occupants of the car fell about sixty feet. Simmons was killed and Field had both legs broken. Miers, although severely bruised, sustained no permanent injury.

In 1895 a letter which he wrote to Sir William Ramsay, immediately after the meeting of the Royal Society at which Ramsay and Rayleigh announced the discovery of argon, advising him to examine the mineral cleveite for compounds of argon, led to the unexpected discovery of helium.

In the same year Miers gave some lectures for Story-Maskelyne at Oxford, and in 1896 succeeded him, on his retirement as Waynflete professor of mineralogy, becoming thereby a fellow of Magdalen College, where he lived for the next twelve years.

At Oxford he created a department of mineralogy, developed a small school of research, and published a number of papers of which the more important (mostly in conjunction with Miss F. Isaac) related to spontaneous crystallization. Among his other pupils were Dr. Herbert Smith, of the British Museum, Dr. H. L. Bowman, who succeeded him as professor, Mr. T. V. Barker, now university lecturer in crystallography, the Earl of Berkeley and his scientific colleague, Mr. E. G. Hartley. In 1902 he published a text-book on mineralogy which has been much used in the United States.

He took a considerable share in the administration of the university, and was a member of the Hebdomadal Council and a delegate of the University Press. In 1902 he succeeded the late Sir E. B. Tylor, the anthropologist, as secretary of the University Museum, be-

coming thus responsible for its administration.

In 1908 he became principal of the University of London, in succession to the late Sir Arthur Rücker. During the greater part of his period of office the Royal Commission on University Education in London was taking evidence, and its report, recommending a large scheme of reconstitution, was only published in 1913.

Among the many activities of the university he associated himself especially with the tutorial classes for working people, with whom his ready speech and never-failing humor made him exceedingly popular. His lectures at the Working Men's College, which was founded some seventy years ago by Maurice, Tom Hughes (the author of "Tom Brown's Schooldays") Furnivall and Westlake, were events to be remembered. He also tried to gather up the scattered units of the very complicated University of London, such, for example, as the College of Household and Social Science for Women, the Officers Training Corps, and the University Club.

He assisted Mr. Albert Kahn to establish his British Traveling Fellowships, and instituted a board of trustees, of which he became a member and secretary, consisting of the Lord Chancellor, the speaker, the Lord Chief Justice with Lords Curzon and Milner as coopted members. Most of the American Kahn Traveling Fellows visited him in London at the commencement of their journey.

He was mainly instrumental in bringing about the Congress of the Universities of the British Empire, which met in 1912, and was to have met again in five years. This was prevented by the war, but the universities bureau has come into existence as the result of the Congress and will organize the next Congress when the opportunity arises.

In 1915 it was clear that the war would prevent any immediate reorganization of the University of London, and Miers therefore accepted the invitation of the University of Manchester to become its vice-chancellor. In Manchester he is already associated with many educational and civic activities outside the university; he is chairman of the Joint Matric-

ulation Board, which determines the admission of students to the five northern universities and examines and inspects secondary schools in their areas of influence; also of the Manchester Royal College of Music, of the Manchester Royal Institution, and of the newly formed northern branch of the National Library for the Blind.

He has been for many years a fellow and governor of Eton College, and fellow of Magdalen College, Oxford; was elected a fellow of the Royal Society in 1896; has been president of the Mineralogical Society, and of the Geological and Educational Sections of the British Association; is an honorary doctor of the universities of Sheffield and Christiania; was knighted in 1912; was a member of the treasury committee which reported on the reform of the Civil Service Class I examinations; and is a member of the committee appointed by the prime minister to report on adult education.

During and since college days he has devoted most of his vacation to foreign travel. In 1892, while assistant at the British Museum, he visited and reported on the public and private mineral collections of Norway, Sweden and Russia and part of Germany.

In 1901 he joined Professor Coleman of Toronto in Canada for a journey of exploration in the northern Rockies, but at the invitation of the Canadian Minister of the Interior changed his plans and visited and reported on the gold mines of Klondike, in company with Professor Coleman. He had previously visited Canada and the Pacific coast with the British Association (spending some weeks also in the United States) in 1897; and was there again with the International Geological Congress in 1913.

He visited a great part of South Africa on the invitation of the Rhodes trustees and the Johannesburg Council of Education in 1903, and was personally concerned in the first appointments made in the Transvaal Technical Institute which afterwards became the Transvaal University College. A second visit to South Africa with the British Association took place in 1905.

Many of his European journeys have been made to places which possess public or private collections of antique sculpture, in which he is interested.

DR. JOHN JOLY

John Joly, M.A., B.A., Engineering, D.Sc., has been professor of geology and mineralogy in the University of Dublin for the past twenty years. He was born in Ireland in 1857 and educated at Trinity College, in which he held various subordinate posts before his appointment to the chair which he now occupies.

For more than thirty years he has carried on research in physics, and especially in the application of physics to engineering, but his exceedingly ingenious mind has led him down many by-paths in search of the solution of problems of general interest.

One of his earliest inventions was the steam calorimeter, by means of which he succeeded in determining directly the specific heats of gases at constant volume. This was a problem in experimental science which had long baffled physicists. Having invented the calorimeter, Joly turned it to excellent account in the examination of a variety of gases over a wide range of pressure and temperature.

Distinguished as a physicist, he is more widely known as a pioneer in the modern method of photography in colors. He was the first in 1897 to take successful photographs in natural colors by the use of a minutely-subdivided screen carrying the three primary colors. On a plate exposed behind this screen he obtained, in effect, three negatives on the same plate. A transparency made from this plate, when placed in an optical lantern behind a screen similarly ruled in red, green and blue lines, displayed the objects photographed in their natural colors. This experiment led, ten years later, to the development of the well-known and very efficient Lumière process on which colored starch grains are substituted for Joly's colored lines.

The ascent of sap in trees is another subject which has occupied his attention, in conjunction with Henry H. Dixon, the professor of botany of Trinity College. He offered a simple

explanation of this phenomenon. The theory then put forward attributes the ascent of the sap to transpiration from leaves of the tree and the tensile strength or cohesion of the fluid in its capillary tubes.

Another matter of very great general interest was dealt with by Joly when he determined the age of the ocean by estimating the amount of common salt carried to it by the rivers and calculating the length of time that must have elapsed in order that the salt in sea water should have acquired its present concentration.

Sections of various kinds of rock show remarkable little rainbow-colored circles. Joly was the first to prove that these rainbow-like circles or pleo-chroic haloes occur about particles of salts of the rare metals uranium and thorium; metals which are always undergoing decomposition into elements of lower atomic weight. The haloes are due to the bombardment of the substance of the rock by the radio-active particles discharged from the heavy elements. The rate of transformation of uranium and thorium into these radio-active substances being known, it has been possible to calculate the length of time necessary for the formation of the haloes and therefore the age of the rocks.

Joly has been a pioneer in the applications of radio-activity to geological phenomena, *e. g.*, the origin of mountain ranges.

The late Professor Lowell's book on Mars led Joly to offer a relatively simple explanation of the canals of Schiaparelli. He attributed them to the gravitational effects of small satellites falling into the planet.

Even biological problems have engaged the versatile professor's attention. In a book entitled "The Abundance of Life" he submits a dynamic basis for evolution.

His interest in radio-activity led him at an early date to suggest the insertion of radium into cancers, and recently—in conjunction with Captain William Stevenson, R.A.M.C.—he suggested the use of emanation needles, which he invented, for therapeutic purposes.

Joly has for many years been a keen yachtsman, and recently has devoted much time to problems connected with submarine warfare. He has suggested many applications of modern

science to navigation, and especially those dependent upon the principles of synchronous signalling.

In his own university Professor Joly is known as a reformer, being largely responsible for various recent changes. He became secretary to the Academic Council on the death of Professor Edward Dowden, the Shakespearean scholar.

During the rebellion in 1915 he took an active part in the defense of the college. An account from his pen of this episode appeared in *Blackwood's Magazine*. He is a commissioner of Irish Lights. He is warden of the Alexandra College for Women. For many years he has been secretary of the Royal Dublin Society. He is a fellow of the Royal Society. In 1910 he received from the society a royal medal. In 1911 he received a royal medal from the Royal Dublin Society.

Among his many publications are to be noted—"Radio-activity and Geology," "Synchronous Signalling in Navigation," "The Birth-time of the World," and a vast number of contributions to various scientific journals, notably to the *Philosophical Magazine*, of which he has been one of the editors for many years.

WILLIAM JOHN KEEP

WILLIAM JOHN KEEP, consulting engineer for the Michigan Stove Company, manufacturer of testing machines and writer on foundry topics, died on September 30. He was born in 1842, at Oberlin, Ohio, and studied at Oberlin and at Union College, where he was graduated in 1865 with the degree of civil engineer. For several years during his residence in Troy he gave a course of lectures on the steam engine to the senior class of the Rensselaer Polytechnic Institute.

During all his life Mr. Keep was very much interested in experimental tests with cast iron and other metals. In 1885 he discovered the relation between the shrinkage and chemical composition of cast iron and devised the systems of "Keep's Test," which he later named "Mechanical Analysis." This is used largely in the United States and other countries instead of chemical analysis. His